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Journal of the Society of Arts.

FRIDAY, AUGUST 29, 1856.

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EXAMINATION OF CLASSES IN INSTITUTIONS.

The next Examinations will be held during the week commencing Monday, the 1st of June, 1857. The programme of subjects, with other particulars, will be published very shortly.

PRIZE ESSAY ON THE SMOKE NUISANCE.

With this week's *Journal* will be delivered to each member of the Society a copy of Mr. Charles Wye Williams' Essay "On the Smoke Nuisance," for which the Special Prize of a Gold Medal, (value twenty-five guineas,) was awarded by the Council.

DRAWING INSTRUMENTS.

The Council have given their approval to a Box of Drawing Instruments, manufactured and sold by Messrs. Parkes and Son, of Birmingham, at the price of 3s. London Agents, *Messrs. Heylin*, 28, Paternoster-row.

MR. ATHERTON'S PAPER ON MERCANTILE STEAM TRANSPORT ECONOMY.

Remarks by James R. Napier, Glasgow.

I quite agree with Mr. Atherton in regard to the indefiniteness of the term "horse-power," as at present used in steam-engine contracts, and in the desirableness of having a dynamical unit, or standard of power or work, legalised, as well for the purpose of buying and selling machines producing power, as for that of scientific comparison. The rule or formula established by James Watt, for the horse-power of condensing engines, was $\frac{P.V}{33,000}$ or $\frac{\text{foot lbs., per minute}}{33,000} =$ horse-power, where the pressure (P), and velocity (V), had either their *actual* values or fractional parts thereof. But at this present time, the pressure (P) is continued at what it was in the days of Watt, viz.—7lbs., no matter what the actual pressure may be now. And for the velocity (V) almost every engineer has a scale of his own, varying according to the length of stroke of the steam piston. Some assuming the velocities to vary as $\sqrt[2]{}$ of the length of stroke, others following the Admiralty rule for paddle engines assuming the velocities to vary as $\sqrt[3]{}$ of the length of stroke. All these assumptions, moreover, have no necessary connection with the results desired, nor with the actual results afterwards obtained, nor do they answer any better the purpose either of the buyer or seller, and all the use they subserve is to fix the size of the cylinder by the very round-about method of resolving an arithmetical or algebraical equation in which two of the three quantities, diameter, length of stroke, or velocity, and horse-power required to be known.

As the term horse-power applied to steam-engines was fixed by Watt at 33,000 lbs. raised one foot high per minute, and as this same value is used by the Americans, the French, the Germans, and, I presume, by all nations where the history of the steam-engine is known, I would be very sorry to recommend any change as to the use of the name in any other sense than as synonymous with 33,000 lbs. per minute. I see no objection, however, to the entire abolition of the term *Nominal* Horse Power, as it is of no use whatever to the engineer, as little to steam-engine owners, and deceitful to the public.

As I adhere to 33,000 lbs. per minute being received as a horse power, I would object to the 33,000 being altered into 132,000, or into any other figure, without at the same time changing the name into something altogether different from horse-power or marine horse-power. I would suggest that the power be expressed in foot lbs. alone, as this is a term already known to all scientific nations. Dividing by 100,000, as Mr. Atherton suggests, the result would be stated in millions of foot lbs. Thus the *Banshee* is, according to Mr. Atherton's work on steam-ship capability, 350 nominal horse-power, 1,752 horse-power of 33,000 foot lbs. = 58,816,000 foot lbs. or $58\frac{8}{10}$ million foot lbs.

As to the tonnage question, I feel I know very little about it, except that the present law is very complex, and certainly does not give what Mr. Atherton would like, viz.—the displacement.

That part of Mr. Atherton's paper concerning the comparison of vessels is very important. What other writers have called the efficiency, or the ratio of power expended to the work produced, is surely a subject which all shipowners ought to be acquainted with. The formula adopted by Mr. Atherton for the efficiency or dynamical duty of steam-ships is, I fear, too rough an approximation to be recommended for general adoption, especially when a more exact and equally simple formula is at hand, and the one also from which Mr. Atherton's adopted formula is no doubt deduced, viz.—$\frac{V^3 \text{ mid. section}}{\text{Ind. H. P.}} = C$. The power in similar vessels, I here take for granted, at present varies as the cube of the velocity. This, I believe, is nearly true, and ought to vary also directly as the immersed midship section. For similar vessels the midship section (m) no doubt varies as displacement $\frac{2}{3}$; but scarcely any two vessels are similar (in the mathematical sense of the term); nor is the same vessel similar to itself when the draft of water varies.

The following table, deduced from published statements of some of the ships of the Navy, and also from vessels built by the firm with which I am connected, shows the difficulty there would be in the use of the formula V^3 displacement $\frac{2}{3} = C$, from the displacement $\frac{2}{3}$ having no necessary connection with the midship section:—

Comparison between Midship Sections and (Displ.) $\frac{2}{3}$.

	Mid. Section.	Displ. $\frac{2}{3}$.	Mid. Sec. Dis. $\frac{2}{3}$.
Ajax	807	212.5	1000:263
Amphion	546	160.	1000:290
Arrogant	580	181.4	1000:313
Blenheim	738	198.2	1000:267
Dauntless	522	171.2	1000:328
Euphrates	570	179.25	1000:314
Hogue	820	215.	1000:261
Horatio	537	142.8	1000:266
Sans Pareil	920	229.8	1000:250
Simoom	567	198.18	1000:350
Termagant	587	179.4	1000:306
Black Swan	385	140.76	1000:366
London	233	86.89	1000:373
Lady Eglinton	207	77.33	1000:373
Queen	122	44.5	1000:365
Bogota (P) very deep	330	134.51	1000:408
Victoria (P)	47	25.	1000:532
Vulcan (P)	56	26.962	1000:481
Lancefield	244	draft. 96.8	1000:397
Fiery Cross	270	12.11½ 100.2	1000:371
	331	14.11½ 117.5	1000:355
	394	16.11½ 135.08	1000:343

In the *Fiery Cross*, at different drafts of water, there is a difference of nearly 3 per cent. in the ratio of midship section to displacement $\frac{2}{3}$, which might affect the co-efficient C to the same extent.

The *Victoria* and *Vulcan* are two river steamers, of nearly the same size and power, yet there is upwards of 5 per cent. of difference in the ratio of midship section to displacement $\frac{2}{3}$. The formula used by Mr. Atherton is, notwithstanding these remarks, exceedingly useful for commencing the designs of steam vessels, and may be an approximation sufficiently near for most practical purposes.

In reference to the table of the performances of steamers, which I recently gave to Mr. Atherton, it is necessary to remark that too much confidence is not to be placed in it as an exact document. Though I aimed at the truth, it is possible I may have erred in the speed which is generally on the Clyde tried between the Clock and Cumbrae lighthouses, or 13⅔ nautical miles—too great a distance for maintaining a uniform speed, especially in new vessels, strange firemen, &c. I believe the statement, however, to be nearly true, and the study of it affords useful lessons. The last column shows the efficiency of the vessels by both formulas; I adhere, however, to the mid-section formula, as being the more correct.

The *Vulcan's* speed and power is deduced from a number of trials at a measured statute mile on the Garelock. The *Simoom's* performances I obtained from one of the dockyards.

The *Bogota*, a common paddle-wheel steamer, employed by the Pacific Steam Navigation Company, and loaded very deeply at her trial, shows a very inferior result to that of the screw steamer *Black Swan* (now *Ganges*), not deeply laden. Their displacements are nearly alike, and their speeds about equal; yet the paddle vessel (too deeply laden) requires about 60 per cent. more power than the screw.

The *London* and *Lady Eglinton* are two screw vessels, near enough alike to be comparable. The screws are the same diameter, but the one is more immersed than the other, which, I imagine, is sufficient to account for at least part of the difference in the efficiency of the two vessels.

The *Edina* was constructed by Messrs. Barclay and Curle, and her engines by Inglis; but I was kindly invited to the trial, and got the particulars of displacement, power, and mid-section from the constructors. The trials of the screw steamer *Lancefield* are not so satisfactory as could be desired, there being a little uncertainty as to speed. At the first trial the screw was not immersed: the result shows a very low co-efficient. The speed at the other trials is uncertain, as it was taken at sea, and not in the usual way for such calculations.

I was unfortunate in not getting the particulars of the power and speed of the *Persia* before she left the Clyde, so as to add her performances to the table.

To the President of Section G. on Mechanical Science.

Sir,—With reference to Mr. James R. Napier's remarks on my paper, "Mercantile Steam Transport Economy," I beg to submit the following observations:—Mr. J. R. Napier concurs with me as to the indefiniteness of the term "nominal horse-power" as at present applied in marine engineering practice, and in the desirableness of having the unit of power, denoted horse-power, specifically defined; and he prefers that the measure originally proposed and acted upon by Watt, viz., 33,000 lbs. weight raised one foot high per minute, be now adopted as the statute unit of horse-power.

On this point I have merely to remark that scientifically it is a matter of indifference what may be the statute measure of the unit, provided it be specific. In my essay on "Steam-Ship Capability," I based my calculations and tables on 132,000 lbs. raised one foot high per minute, because that was the average performance per nominal horse-power of the ten mail-packets then employed in H.M.S. In my paper on "Mercantile Steam Transport Economy," I have suggested that 100,000 lbs. raised one foot high per minute be adopted as the statute unit of horse-power, because that is, I believe, about the average present practice in the highest class of our merchant steam-shipping, and this measure of the unit would facilitate calculation; but whether 33,000 or 100,000, or 132,000, or any other number of lbs. weight raised one foot high per minute, be adopted as the statute unit of horse-power, is a mere matter of convenience, a question very proper for being submitted for the consideration and recommendation of a committee.

As to the question whether the formula $\frac{V^3\ D^{\frac{2}{3}}}{\text{Ind. H.P.}}$ or $\frac{V^3\ \text{Mid. Sec.}}{\text{Ind. H.P.}}$ would be the better formula for determining the relative dynamic merits of steam-ships, these formulæ are, as respects *similar* types of *immersed* form, a mere transformation of terms, for in similar types of form the immersed midship section will vary in the same proportion as the cube root of the square of the displacement. These formula would, therefore, give proportional results. I have, however, preferred the formula based on displacement $\left(\frac{V^3\ D^{\frac{2}{3}}}{\text{Ind. H.P.}}\right)$ because this formula may, as I believe, be made the base of calculations as to the capability of ships for mercantile service, for which purpose the formula based on midship section, without reference to displacement, is inadequate.

The table of data now supplied by Mr. J. R. Napier is a valuable addition to our statistical data, in so far that, after having determined the relative dynamic merits of the ships referred to, and classified them accordingly, the information afforded by this table will aid in the analysis of their respective types of form. I would, however, beg to suggest that the position of the centre of gravity of the immersed midship section of each ship expressed by its depth below the surface line at which the displacement has been calculated, would be a very important addition to this table, and it is hoped that Mr. James R. Napier will be able to supply it.

In fact, it is in consequence of the depth of the centre of gravity not being noticed in the formula above referred to, that I have spoken of it in my paper as "open to criticism," and probable amendment, and I shall be prepared, in committee, to submit this view of the case for consideration. Requesting that this letter be read conjointly with Mr. Napier's remarks,

I am, &c.,
CHAS. ATHERTON.

DECIMAL COINAGE.

On the occasion of the adjourned discussion held on the 23rd of July, on Professor De Morgan's lecture on this subject, Mr. Robert Slater, jun., made some remarks in reply, of which the following is the substance:—

The silence of the "tenpenny men" at the meeting held by the Decimal Association at the rooms of the Society of Arts, on the 16th of this month, did not arise from any doubts of the scheme we have suggested, or from any convictions wrought in our minds by the arguments Professor De Morgan employed on that occasion, but we were indisposed to risk placing ourselves in the invidious position in which Mr. Minasi considered himself placed when he attended the meeting first held on this subject at the London Tavern. We felt we had not been recognised by the Decimal Association, who had ignored the "tenpenny men" in recapitulating the various plans proposed.

When we contrast our position with that of the £-and-mil plan, I think we have no cause to regret the comparison. The "tenpenny men" have forced themselves into their position from the practicability of their views, whilst, on the Professor's own admission, the Decimal Association has been struggling, or, at least, the advocates of that scheme have been struggling, since 1816, and to our minds, that plan is as far from the goal now as when it was first started; and we arrive at that conclusion because, for various reasons, we regard the scheme as impracticable. On one point this opinion is shared by its advocates in common with us. They feel that their system wants commensurability with our existing coins, and have devised various plans to overcome that difficulty.

At one time there was to be an arbitrary declaration by government, giving the value of four mils to an ordinary penny, and five mils to the broad-rimmed penny, but this soon fell to the ground. Now we have this notable scheme of tacking on a farthing to the sixpence, which we hold to be doing an injustice, or, as the Professor very rightly termed it in his lecture, a "robbery." I am glad it is admitted as a robbery, but, at the same time, I cannot approve of the qualification the Professor has chosen to place upon it. He said it would be only "a very small robbery," which reminds me of the anecdote of the frail spinster, who, when accused of having had a child, retorted that it was "only a very little one." I think this bantling of the Decimal Association, if only a very small one, equally illegitimate, but it will grow to the dimensions of a giant. Professor De Morgan proposes that sixpence should be current for six pence in copper and a farthing. Of course a shilling will be current for twice as much in copper, that is, 12½d., the florin for 25d., and the pound for 250d. We "tenpenny men" are anxious to have a coin representing 250 copper pence, but we can have it without doing injustice to any one.

Mr. Minasi, in his letter, has said that our views have been misrepresented in respect to the concurrent circulation of our existing with the tenpenny coins, the franc and its multiples, on which point Professor De Morgan anticipates great difficulties. Now, we apprehend no greater difficulty than at present exists in the concurrent circulation of threepenny and fourpenny pieces, or half-crowns and florins, and we should not complicate matters by introducing two coins of the same value of different sizes, as is the case with the florins.

The climax of Professor De Morgan's arguments against the "tenpenny men" was, that he would be glad to see how they would approach the pay-table. The Professor stated in his lecture that he was manager of a Savings Bank, and had to pay and receive large amounts weekly in silver. If I might venture to give my advice upon this matter, speaking from practical experience, I would recommend that the silver should not be kept in the bulk, but, as received, it should be counted, and the several descriptions of pieces kept separate. This is always done by bankers' clerks, who mark the contents of each package of silver; they have also a separate bowl with a small quantity of mixed coin, and thus it is easy to pay away large amounts in silver.

We were asked how we would pay 17s. 6d. to the workman for his week's wages. We should give him seven half-crowns if we had them, and if we had only tenpennies we should give him 21. The workman would very soon understand that a half-crown contains three tenpennies; he would combine the two together, and would thus experience no difficulty in finding that the amount if paid in a mixture of coins was correct.

But, suppose he had to receive 17s. 6d. by the £-and-mil system. The master would give him 17s. in silver, and as copper would be thrust upon him under the plan proposed, he would give him the sixpence in copper. The receiver says, "I must have my additional farthing." The master replies, "I have no farthings; here is a sovereign, give me the change," and when the man tendered two shillings in silver, and sixpence in copper, the same squabble would arise again over the farthing. Either the master or the workman must lose it. If the master loses it, it would involve the necessity of having an immense number of farthings to meet all these odd payments.

But, suppose the man had five days' wages to receive. That would be 14s. 7d. of our present currency. In that there would be no difficulty under the tenpenny plan, but the amount could not be paid by the £-and-mil system, whilst there would still be the squabble over the sixpence, and another with regard to the fraction of the penny.

If the shilling is not to have the same effect in its relation to copper, an agio would be introduced upon a particular class of coins, which would be destructive of any decimal system.

But take the £-and-mil scheme further. Supposing a merchant to pay his clerk a month's salary at the rate of £100 a year. Under the Professor's scheme it cannot be paid exactly. The nearest approximate to it is paid, and at the end of twelve months the man finds he has received a trifle less than £100. A month's wages at the rate of £100 per annum, would be £8 6s. 8d.; by the tenpenny plan the exact amount may be paid. The merchant, in posting the transaction in his ledger by £ s. d., or by the tenpenny, would require only three figures, whilst by the £-and-mil, four figures would be necessary, increasing his labour 33⅓rd per cent. Mr. Minasi, by his table,* has established the fact that, by the tenpenny plan amounts can be expressed in figures less by from 4½ to 9 per cent., than by the £-and-mil scheme, and in a trifle less than by the exisiting plan. The National Debt has been cited as an instance against us on this point. I do not know how it stands at the present time, but on the 5th of May, 1846, it amounted to £785,053,022 8s. 3¾d., and the annual charge to £28,125,534 10s. 6d. Thus, under the existing system, the £-and-mil and the tenpenny plans, the amount is expressed by 13, 12, and 13 figures respectively,—whilst the charge is expressed by 11, 11, and 10 figures respectively.

I further object to the £-and-mil scheme, because it would affect nearly all existing contracts between a halfpenny and fourteen or fifteen shillings or more, in which odd pence are involved. As these are matters of exact computation, they would require to be exactly expressed, or else there would be a loss sustained, or a "robbery" committed, if this scheme were adopted, because, under the £-and-mil scheme, you cannot exactly express any amount used in the present coinage except even shillings and sixpences.

But one of the greatest objections we have to the £ is, the fact of its being so high a unit, that, in order to work calculations of small values, a multiplicity of figures must be introduced. This has been alluded to fully in the book published by my father, and as the Professor has referred to that book, and appears to be acquainted with it, and yet in his lecture passed this point by in silence, I take it that the arguments there used are unanswerable by the £-and-mil party.

To take a simple example, however, exhibiting this difficulty, look at the case of the workman with 17s. 6d. a week. When he takes his money he has to convert it into mils. Tacking on the odd farthing got out of his master, he finds he has 876 mils, and is astonished at the large amount he has to dispose of. In the abstract it seems so large that he can hardly conceive he will be able to spend it. By and bye his landlord comes for 125 mils for rent —half-a-crown a week—then he goes to provide his Sunday's dinner, and finds dealers vend their wares by 33's, or 45's, or 57's, whereas they are now calculated by 8d., 10d., or 14d., and odd halfpence, which he can grasp readily in his mind. Having been subjected to so much mental exertion in the market he finds some refreshment necessary. He meets a friend, and invites him to have a pot of beer; but as they cannot settle the decimal question so soon as the beer, they order another pint. The man has been in the habit of getting beer at 2d. per pint, and foolishly imagines that his three pints will be paid for by six copper penny-pieces. But the landlord says, "I do my business in mils now; my beer is 9 mils a pint, that's 27 mils for three pints, which require seven 4-mil pieces less a farthing;" and the man finds he has lost not only the farthing gained from his master, but two others to boot. That would not be calculated, I think, to reconcile him to the £-and-mil system.

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* *Journal of the Society of Arts*, Oct. 5th, 1855.

The views which the tenpenny men entertain upon the system of decimal coinage, are to a great measure shared in by the advocates of the International Decimal Association, who, it appears, desire to introduce the French system in its entirety. We do not, however, wish to do that. By the tenpenny plan, we should be able to calculate exchanges in many instances by a per centage, as the French now do with the Belgians. They say, for instance, the exchange between Paris and Antwerp is ¾ths or ⅞ths per cent., as the case may be. We have never stated that we look upon our tenpenny as the exact equivalent of the franc, because we do not propose to alter the standard of value either in gold or silver, which the International Association must do, if they would introduce the French system as it stands. We would maintain our standards of gold and silver in their integrity, and any charge against us of wishing to alter the standards is not correct. The only alteration that was proposed before the International Association arose, was on the part of the £-and-mil people.*

The £-and-mil scheme would not facilitate intercourse with foreign countries in matters of exchange. In some instances it would throw difficulties in the way. In the case of a country using dollars, and where we quote the exchange in pence, and go so low as one-eighth of a penny, this scheme is incapable of showing the nice distinctions which could be shown by the tenpenny system, which admits of such quotations being made as they now are. The general language of persons using coin under the tenpenny system would be identical with that at present in use, because, until we arrive at an amount of two shillings or more, the prices of articles are quoted in pence.

The observations I have made may be said to be the general opinions of our party,—but there are some points which we have not yet quite matured. We are not prepared to say at present how long we should require the exisiting coins to remain in circulation. We lay down broad principles for guidance, and leave it to the people to fix the details, and the mode of carrying the thing out as is most convenient to them. Some of us would be glad to see a decimal coinage immediately instituted with tenpence as the integer; others of us say, do not introduce decimal coinage based either upon the penny or the pound, unless you decimalise weights and measures at the same time. I may state that we are not at present prepared to recommend a plan with regard to weights and measures, nor are we prepared to adopt the French system, because we think that the majority of contracts are not founded on French weights and measures, but that English weights and measures carry the preponderance over those of the French in the commerce of the world at large. A reason for disapproving a decimal system of coinage alone is, that there are many principles in the existing system of our weights and measures which we consider desirable. There are many absurd differences, both of nomenclature and value, that we cannot approve of, and should be glad to see swept off, but we admire the principles involved in the subdivisions of the cardinal weights and measures, which a decimal system does not possess to nearly the same extent, and there are certain ratios between our weights and measures, and between the weights and measures and the coinage, which I consider most convenient for purposes of calculation; indeed, mental calculation can be carried on by the existing system to a large extent by a simple process, which under any decimal system would not be possible. The £-and-mil scheme would entail a vast increase of labour over the existing system, and even over the tenpenny system, because large quantities have to be resolved into small values for the purpose of being retailed amongst consumers, therefore, our system should be one capable of subdivision to the utmost extent.

I would, in closing, refer to the terms of the circular by which the meeting was convened. We were invited to hear a lecture "Upon the Present Position of the Decimal Coinage Question." During the week which has elapsed since that was delivered, there must have been some great change wrought, for the card calling the adjourned meeting alludes to it as a lecture "On the Approaching Simplification of the Coinage." Now I believe the witnesses called, up to the present time, by the Commissioners who have the matter in hand, have been generally opposed to the £-and-mil scheme, and therefore I can only imagine that the arguments used by these parties have worked so powerfully on the minds of the Commissioners, that they see that the penny cannot be done away with, and that they must adopt the tenpenny system, since the talk is of the simplification of the coinage. I should rejoice at that, were our weights and measures at the same time decimalised, but under any circumstances should regret the adoption of the £-and-mil scheme, and I think the country at large would be equally dissatisfied with it.

MEANS FOR PREVENTING THE FLY FROM DESTROYING THE TURNIP PLANT.

By Charles Poppy, Ipswich.

From the great loss of plant of turnips last year, and general destruction of turnips this year,—so similar to what occurred from 1825 to 1833, and I believe onwards, and which has taken place periodically for several following years—I am led to publish the following observations on the subject, although I am quite aware of the difficulty of the subject from past experience, having had a correspondence with the Secretary of the Society of Arts, upwards of thirty years since, which continued for a year and half, as is reported in the "Transactions" of the Society, vol. 45, pages 11 and 54, in 1827.

The Doncaster Report on the Turnip Fly, published in 1834, consisted of 89 pages. I can, however, but briefly enter upon the subject; thus my observations will chiefly relate to the remedies proposed within the power of farmers

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* This was questioned at the meeting by the £-and-mil advocates when Mr. Slater read from page 59 of the *Decimal Association Proceedings*—"Gold, our only legal standard of value, is inevitably the sole basis or starting point of our monetary system; and though other metals can and do serve for small change or as tokens, it is convenient that authorised subdivisions of the pound sterling should, like itself, signify so much gold; *i.e.* corresponding proportions of the sovereign in weight, even though they be not so represented in actual gold coins. I have worked out a system which by slightly modifying the assay, standard, or quality of our gold coin (*i.e.* altering its *gross* weight while preserving its actual *net* weight in fine gold, as by law established), many important desiderata may be at once secured."—*Mr. Franklin.*

individually to apply, and suggest a *probable* means of so reducing the flies as to render them harmless, by a systematic application.

From the loss of the first plant of turnips, all farm-work is thrown in arrear; re-ploughing and sowing, and hay-harvest at the same time to attend to; no turnips fit to hoe when the hay is stored. If the second sowing take, the turnips are not fit to hoe till corn harvest begins.

Mr. Blake, agent to Sir J. H. Palmer, Bart., Rockingham, says:—" Never lost a plant; attribute this to *drilling thick.* Plants draw each other up." C. Barnet, Esq., Stratton-park, Northamptonshire, says:—" Sows *thick in the drills;* though the flies make a severe attack, they will turn out a good crop." Mr. Slater, Stratton, near Cirencester, Gloucester, says:—" Bid defiance to the fly by sowing eight or ten pounds of seed per acre." —*Extracts from Doncaster Agricultural Association Report.*

Mr. Taylor, late of Ditchingham, near Bungay, Norfolk, and Mr. John Hayward, of Stoke-hall, near Eye, Suffolk, both "broad-casted very thick, and cut the turnips into rows with the horse-hoe, and always succeeded in obtaining a plant." Mr. Taylor and Mr. Hayward both occupied good turnip land farms, or I doubt whether a plant could have *always* been obtained in defiance of fly, if *broad-casted, unless excessively* thick.

Many of the correspondents of the Doncaster Association state, that by sprinkling lime over the turnip plants *several times,* they commonly obtained a plant of turnips; others state that soot is preferable to lime, as it manures as well as annoys the fly.

One watered a field five times at a cost of fifteen shillings per acre, and saved a plant; water obtained at both ends of the field.

I could greatly increase this list of specifics, having selected the most popular only; but I believe, from upwards of thirty years' practice, that a more certain mode of obtaining a plant exists, *which is less expensive, and applicable under any circumstances, drilling or broad-casting, on the ridge, or on the stetch,* highly manured or not, as far *as the fly is concerned.*

The mode and means of obtaining a plant of Swedes might be stated in few words, but to induce farmers to try it, the reason why it may *rationally be supposed that it will prevent the fly from destroying or injuring the turnip plant, and that it is but a trifling expense, and little trouble, must be explained, and facts stated.*

Having hired a heavy land farm, bounded on two sides by extensive woods, in which I was informed by the late Rev. Wm. Kirby (the eminent Entomologist), that "all the turnip flies in the neighbourhood hybernated during the winter." After ascertaining that such was the fact, I decided to give up attempting to grow swedes, as I had *rarely obtained a good plant,* and frequently had to sow a second time, and I did not always succeed then.

It was by accident that I ascertained that the fly preferred the common turnip. Mr. Kirby had informed me of the nature and habits of the fly, "that they could fly as well as the golden beetles, or any of that tribe of insects, and that it was useless for me to persevere to grow swedes, as none of my neighbours grew them, and common turnips were not required to be sown till long after swedes, and thus *all the flies existing in the neighbourhood were drawn on my swedes.*

Thinking that if such was the fact it might *enable me to grow swedes, instead of preventing my being able to obtain a plant,* being aware that Mr. Paul of Starston was in the habit of sowing decoys for the flies, and catching them off with a net, I took my drill to a clean fallow field lying along the side of a wood, and drilled one width of the drill across the middle of it, being twenty rods probably from the wood. As soon as the turnips were up, flies attacked them, but being *very thick* the turnips kept growing. Having given the flies time to collect, I had a waggon load of haulm taken to the field; this I had spread over the turnips and along the sides as far as flies leap; and having plenty of help, set fire to it from end to end and burnt up the turnips, and as I supposed, all the flies which had existed in the woods and neighbourhood; but on sowing the field with turnips, others came and destroyed the plant.

Thus at the proper season for sowing common turnips (having plenty of swede seed, and having an iron barrel to my drill, with cups of all sizes on blocks which could be slipped on; and having adopted the general opinion that the fly preferred the swede to the common turnip), I filled every alternate hopper of the drill with common turnip and swede, and thus drilled probably more than half a peck of *swede seed per acre,* at 15 inches from row to row. But to my surprise the fly settled on the white turnips, and scarcely touched the swedes. Finding this, I had the swedes chopped into patches, and, when an inch or two high, had a pinch plucked out of every bunch of swedes, and when a little more grown I had another portion plucked out from each patch, and then left till fit for singling. By this means I got a regular plant and fair crop, considering that it was late for swedes.

Having ascertained that the fly prefers the common turnip to the swede, I drilled white turnips in alternate rows in future (*very thick, to feed the flies*) and swede seed for a crop, and never failed to obtain a plant after.

After having adopted drilling common turnip seed in alternate rows, with swede-seed intended for a crop, some years, a small farm fell under my care where the bailiff said swedes could not be grown, as the fly would destroy the plant. I however decided to try to grow swedes, and having steeped common turnip seed in water to cause it to vegetate before the swedes were up, and having primed the drill with swede and common turnip seed, I sent it off to the farm, and followed myself. After having seen a few bouts drilled, I left. As soon as I was gone the bailiff stopped the tunnels that distributed the common turnip seed, " to ascertain what difference it could make" —a good plant, and excellent crop was grown.

This circumstance showed that it was not necessary to drill decoys at such narrow intervals, and in future the furrows only were sown with white turnips, and I never missed getting a plant of swedes.*

I left off *drilling decoys* on my own farm also, and only sowed furrows *excessively thick* four or five stetches distance (more or less according to soil or weather), and still never failed of obtaining plant.

In 1825 I entered into a correspondence with the Secretary of the Society of Arts on the subject, which continued for a year and a half, when the Society awarded me a Gold Ceres Medal.

They had it tried in the neighbourhood of Blandford, Dorsetshire, as stated in the Report of the Transactions of the Society for 1827, page 12 of preface. It is stated that the result of this "was the only good crop of *turnips obtained during the last year* (1826) *in that part of the country.*" 1826 happened to be the most *general* destructive fly year recorded, or my system would have had no effect, and would have been thought to be as useless as numbers of other modes which had been thought to have been a means of saving crops from the attacks of the fly.

Mr. Spence, chairman of the Entomological Society (being on a visit to Mr. Kirby), called on me to inquire about the mode I had adopted, and seemed not to doubt but it was adapted to protect the swedes.

Sir John Sinclair had a copy of the account of it, published by the Society of Arts, inserted in an Edinburgh paper, and had copies of it struck off to distribute in Scotland, and sent me a large packet to distribute, and it led to a long correspondence between us.

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* As this farm was within a mile of Ipswich, a turnpike-road on one side of the field, and a riding way through, where the farmers frequently rode, I took care to drill the decoy rows thick enough to supply the flies.

If any one should be induced to try the decoy systems I have described, they should continue to use the same means to obtain a plant they now pursue, *until they are convinced of its being a protection from the attack of the fly.*

Many farmers doubt the probability of a few rows of turnips or mustard, being *drilled thick*, protecting a crop. There are few farmers who have not seen where a drill coulter has been stopped and the seed accumulated till the obstruction broke away and scattered the seed very thick for a rod or two, that when the plants over a large field have been swept off by the fly, the thickly drilled has withstood the attack of all the flies long after the crop was destroyed. It is the same if seed is spilled *in some measure*, but nothing like the *drilled*. Another circumstance relating to the fly question may not have occurred to the reader of this treatise. By an experiment, turnip seed sown and covered with garden mould four inches, on the fourth day had shot forth a radicle two inches long, and a germ one inch.

Thus the root reached *from the surface* six inches, while the germ was then *three inches* under the surface, and at *the same ratio*, in four days more, the root would have reached eight inches from the surface, while the germ would yet be two inches under the surface. If the root cannot penetrate the land to that depth, the fibres spread, but under the above circumstances the bottom of the root is not parched up, if parching weather occur, it is delving into a moister soil, the lower and lower it descends, and when the germ appears above ground, it is far more able to withstand an attack of the fly and put forth leaves.

Another portion of the seed was sown and covered one-inch deep with mould; this had shot forth a radicle one-and-a-half inch deep in four days, and a germ half an inch; thus in the same ratio, within four days more, the germ would have reached the surface when the radical had reached but four inches in depth, and not reached below the influence of parching winds, and the plants would not be able to withstand the attack of fly, and if no fly exist, would grow slow and weak, and be very slow in coming to the hoe.—*See Potts' Cyclopædia.* We must take extremes to show effects. Four inches seem too deep to deposit turnip seed, and one inch is evidently too fleet, except on favourable soils or moist weather, and it is only by using a drill that turnip seed can be deposited at a proper depth according to soil and weather. A few years after I had used wide intervals for decoys, I drilled a small space with turnips early to try the effect of different manures. The flies soon infested them, but having sown two acres of mustard in an adjoining field, *the flies left the turnips and settled on the mustard*, and there remained till it was harvested, ascending as the bottom leaves withered; thus I ascertained that the flies preferred mustard to common turnips, and I feasted them afterwards by sowing mustard for decoys. Mustard grows more rapidly than turnips, and can bear an attack of the fly better, not being affected by drought and piercing winds. The seed is commonly cheaper, and I have found it equally adapted to decoy the flies. I sowed it for decoys for the *first sown common turnips*, unless it was in a wet season, when there was no fear of fly. In two instances my decoys of mustard saved my turnips from being destroyed by black caterpillar (larva of the saw fly), and when my neighbours' turnips were so infested that they employed women and children to gather them off, I had none on my turnips.

I continued to sow decoys during upwards of thirty years, and never failed in obtaining a plant, although after finding this a certain mode of obtaining a plant in spite of the fly, I reduced the quantity of seed I had drilled from a quarter of a peck to a pint. This mode cost less, and I grew my decoy seed from untransplanted roots—seeds of selected and transplanted roots produced smaller tops and roots, and thus the plants were less able to stand an attack of the fly.*

The Rev. Mr. Berry, Pershore, stated that, "having cleared a piece of rough land, and planted it with hops and intermediate rows of cabbages, the cabbages became covered, and ultimately destroyed by turnip flies; and having consumed the cabbages, they attacked the hops and destroyed them."

From these circumstances it appears that if a small space was sown (or better, if drilled) with mustard some time, and the longer the better, before turnips were sown, few flies would infest the turnips. Such a space might be sown where white turnips were intended to be sown, and when the land was wanted the mustard might be mowed and ploughed in, and it would be worth as much as the seed cost, as manure.

As millions of turnip flies may be drawn to a decoy, it is evident they might be so thinned as to do no serious injury to the turnip crop, at a trifling expense, if this mode was extensively adopted. It is useless for a farmer or two to do so, as other swarms of flies would come.†

One breadth of a drill, drilled a few rods in length, will draw all the flies existing near by; it should be drilled so thick *that the plants draw each other up*, and a heavy roll passed over two or three times must surely destroy all the flies. This cannot be doubted, if the space is ploughed and a heavy roll passed over it, it *must destroy them.* A small garden patch of turnip seed will supply enough for decoys, and, as it does not require transplanting, costs little. The same is true of mustard seed, and it is not subject to blight or to be injured by birds.

I am led to publish this treatise from the turnip fly abounding in this neighbourhood, so that many have had two sowings swept off, and one only that I have heard of not having one sowing destroyed, with a prospect of failing to obtain a plant from a second or third seeding.

Turnip flies abound periodically, and when they do, they abound for several following years commonly. They so destroyed the crops from 1824 to 1833, that the Doncaster Agricultural Association distributed circulars over England and Scotland, requesting information on the nature and habits of the turnip fly; and received 102 returns, but with little practical information; it was too expensive and did not meet every circumstance.

To sow turnips *very* early to be in time to sow a second time in case the fly destroy the plant, frequently causes a loss by cost of seed and labour. If the first sown escape the fly, it is very liable to mildew, and to be of inferior quality; and if the fly attack the first sown, waiting to ascertain whether a sufficient plant will survive may prevent sowing a second time till it is too late to get a good crop. The reason a second sowing generally survives an attack of the fly, (if the land is re-ploughed), is because it has laid a length of time without being stirred, and has gained moisture; such will be the case if left untilled for a time, and unsown till the proper time for sowing, according to soil and weather.

A seed merchant (a correspondent of the Doncaster

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* Having two acres of turnip seed—when it was cut, an immense number of turnip flies settled on some rows of cabbages growing alongside of it—I had not observed the flies on the seed. There were four acres of young swede turnips growing in the same field, yet the flies remained on the cabbages in a dull state, not leaping when disturbed, but tumbling on the ground.

† Mr. Chas. Neal, Mansfield Notts, says, "In 1826—had a field of nine acres sown the first week in June with rape. In a few days after, the plants were covered with flies. The field admitting of irrigation, water flowed over it for three hours, and the destruction of thousands of flies witnessed; but the very next day the plants were completely covered with fly, and it ended in the total destruction of the crop."—*Doncaster Report.* "In 1786, one hundred thousand pounds were lost by the destruction of the turnip crop in Devonshire by the fly."—A. YOUNG'S *Annual.*

Agricultural Association) stated that " those who sowed early were his best customers." The question to be considered is whether it is less expense to sow decoys during two or three years when no injury would have occurred from the attack of the fly, or to lose a plant, and have to plough and re-sow the land once in two or three years. It is not whether the plant is destroyed only, but whether it is jagged, stunted, and retarded in its growth, and a long time in coming to the hoe.

When the cause of smut and earcockle in wheat became generally known, a remedy was soon found. And as the larvæ of the wheat-midge fall to the ground, when the milk of the kernel is consumed, where a crop is much injured the land ought to be thinly skimmed, raked, and burned. " The turnip fly never injured the crop the following year."—*Doncaster Report.*

Science must discover the cause of agricultural pests, but accidental circumstances more commonly lead to the discovery of remedies.

The certain mode of obtaining a decoy to protect the crop, is, to drill *one row of mustard on the stetch* between the crop plant, or if thick enough, every three or four stetches is sufficient. I state this because I see furrows sown where no mould exists, slaky and cloddy, and of course no manure!

If any one fail to protect their crop, I believe it must be from mismanagement.

SUMMARY.

The first warm weather in the spring revives the turnip fly from its dormant state, and it issues forth from its hiding place in search of food, and returns to sheltered places at night.

In May and onwards through the summer the fly continues, day and night, on whatever food it has settled on, till rape or turnips are above ground. Their being able to fly may be ascertained by putting in rows of turnips *thickly* with the hoe *in the middle of a field.*

Whether the fly has a choice of food may be ascertained by putting in rows of mustard, rape, common turnips, and swede, at a little distance from each other. And this will show whether the flies can be destroyed—when disturbed they leap a few inches only; thus a heavy roll, or being covered by the plough, must kill them, or haulm or straw scattered over them, and set fire to, will singe their wings.

REPORT OF THE PATENT LAW COMMITTEE OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

MADE 12TH AUGUST, 1856.

At the meeting of the British Association held in Glasgow (September, 1855), a Committee, consisting of the Earl of Harrowby, the Duke of Argyll, Sir David Brewster, W. Fairbairn, Thomas Graham, Col. Sabine, and Thomas Webster, was appointed, on the recommendation of the Mechanical Section, " for the purpose of taking such steps as may be necessary to render the patent system of this country, and the funds derived from inventors, more efficient and available for the reward of meritorious inventors, and the advancement of practical science."

This Committee, after reviewing the position of the question, in reference, not only to the report of their immediate predecessors, the Committee appointed at the Liverpool meeting of the British Association, but to the proceedings at former meetings of the Association, and of other parties, at the Society of Arts, the Manchester Committee (presided over by your Vice-President, Mr. Fairbairn), and the United Inventors' Association, and the powers existing under the " Patent Law Amendment Act of 1852," presented the following Memorial to the Lord Chancellor:—

" *To the Right Honourable the Lord Cranworth, Lord High Chancellor of Great Britain.*

" The undersigned members of a Committee of the British Association for the Advancement of Science beg leave to present the following statement to your Lordship.

" The amendment of the patent laws, and the encouragement to be thereby afforded to practical science, has from time to time occupied the attention of the British Association for the Advancement of Science. At the meeting of the Association in Glasgow, in September last, the following resolution was passed:—

" ' That the Earl of Harrowby, his Grace the Duke of Argyll, Sir David Brewster, Colonel Sabine, the Master of the Mint (T. Graham), William Fairbairn, and Thomas Webster, be a Committee for the purpose of taking such steps as may be necessary to render the patent system of this country, and the funds derived from inventors, more efficient and available for the reward of meritorious inventors and the advancement of practical science.'

" At the meeting of the British Association at Liverpool, in the preceding year, a similar resolution was passed, appointing a Committee, also presided over by the Earl of Harrowby.

" The report of that Committee to the meeting of the Association at Glasgow, and the proceedings thereon, are sent herewith.

" In that report, and in the discussion to which that report and another communication on the patent laws gave rise, at the Glasgow meeting of the British Association, attention was directed to various defects in the present system, all, or nearly all of which had been the subject of evidence before, and of consideration by, the Select Committee of the House of Lords, in 1851, on the Patent Bills of that session. These defects were intended to be provided for by the ' Patent Law Amendment Act, 1852,' establishing the present system, and it is believed that the greater part of them are capable of being dealt with by a liberal interpretation and administration of the powers of that Act.

" The first section of that Act provides that the Lord Chancellor, the Master of the Rolls, and the law officers for England, Scotland, and Ireland respectively, together with such other person or persons as may be from time to time appointed by her Majesty, shall be ' Commissioners of Patents for Inventions.'

" The first report of the Commissioners of Patents contains the following passage:—' The law officers of Scottand and Ireland not being in England at the commencement of the Act, took no part in the proceedings (*i.e.* of bringing the Act into operation), and as the functions of those officers, in respect of patents for inventions, are entirely abolished, it is not to be supposed that they (the law officers of Scotland and Ireland) will be called upon at any future time to act as Commissioners.'

" In reference to the result of this interpretation of, and proceedings under, the Act, and of the non-appointment of any other person or persons as a Commissioner or as Commissioners for the administration of the new system, the report of the Liverpool Committee says:—' That system has been so arranged as to exclude the law officers of Scotland and Ireland from its administration, and to devolve the responsibility on the Lord Chancellor, the Master of the Rolls, and the Attorney and Solicitor-General of England, whose other official duties are so numerous and engrossing as to prohibit their affording that attention to the development of a system confessedly so difficult as to be incapable of adequate administration without the co-operation of persons practically acquainted with the requirements of the system intended to be established, and for the establishment of which ample provision and powers are contained in the Act.'

" The Committee of the British Association, having regard to the inherent difficulty of the subject, and to the number of questions, either of administration or of legislation, adverted to in the accompanying report, and at the Glasgow meeting of the British Association, respectfully suggest that her Majesty should be advised to appoint some other persons as Commissioners of Patents under the 'Patent Law Amendment Act, 1852,' or that the working of that Act should be the subject of immediate inquiry.

"(Signed)
HARROWBY.
ARGYLL.
EDWARD SABINE.
THOMAS GRAHAM.
WILLIAM FAIRBAIRN.
THOMAS WEBSTER.

"London, March 11, 1856."

The Lord Chancellor has recently expressed, through the Earl of Harrowby, a willingness to comply with the prayer of the memorial, on being distinctly informed and satisfied as to what such Commissioners would be expected to and could do; to this the Committee of last year have not had the opportunity of making any reply, but they are encouraged by various circumstances to believe that these and similar efforts, if persevered in, will not be in vain, and that the reform of the patents, which in the first address of your first president, the Rev. Vernon Harcourt, was pointed out as one of the subjects to which a scientific Association might be justly expected to call public attention, and which has repeatedly been brought before your meetings, will ere long be recorded as one of the many results of the British Association.

A discussion then took place, in which Messrs. W. Grove, Q.C., Wm. Fairbairn, and others took part, and on the motion of Thomas Webster, seconded by P. Le Neve Foster, the following resolution was passed—"That the Earl of Harrowby, Lord Stanley, M.P., James Heywood, M.P., The Master of the Mint (T. Graham), Wm. Fairbairn, General Sabine, and Thomas Webster, be a Committee for the purpose of taking such steps as may be necessary to render the patent system of this country and the funds derived from inventors more efficient and available for the reward of meritorious inventors and the advancement of practical science."

INTERNATIONAL PHILANTHROPIC CONGRESS AT BRUSSELS.

The Congress will be opened on the 15th of September next, and its sittings will be held in the hall of the Royal Academy of Sciences. No one can be admitted without a ticket. The tickets may be obtained on application, on and after Sept. 12, between the hours of 10 o'clock and 4, at No. 22, Rue des Arts, Quartier Leopold.

The questions to be submitted to the consideration of the Congress have been divided into the three following sections:—

Section 1.—Supply of provisions in relation to agriculture.

This will include all questions which refer to the prevention of the evils resulting from short leases, an unequal balance in the agricultural labour market, or unfair taxation. The best means of extending the principles of association and insurance, and encouraging the improvement and cultivation of waste lands, together with the cheap transport of produce, drainage, manure, the breeding of cattle, the establishment of model farms, agricultural schools and museums, and the publication of statistics of produce in various countries.

Section 2.—The supply of provisions viewed in relation to political economy and philanthropy.

This embraces the consideration of free trade in food and all necessaries, and the means of lessening those taxes which have a tendency to raise the prices of these commodities.

The best method of arranging markets, the regulation of weights, measures, and coinage, and the establishment of a strict supervision over articles of food, for the prevention of their sale in an unwholesome state, will come under discussion. The advantages of the spread of sound doctrines of political economy, and the publication of correct trade statistics, will also be noticed. The judicious encouragement of importation, with special reference to the large quantities of cattle in America and other countries, the extension of fisheries, and the occasional purchase by the government of foreign produce for the supply of the army and other public establishments, so as to avoid producing a scarcity in the home markets; the checking the distillation of alimentary substances, both as diminishing the supply of food and as promoting drunkenness and crime; savings' banks, benefit societies, and other institutions for promoting the encouragement of habits of prudence and foresight among the working classes; the regulation of emigration, and the possibility of establishing a permanent commission in each country to follow up the purposes of the Congress; these and other kindred subjects will form the business of this section.

Section 3.—Scientific and mechanical processes connected with the supply of provisions, the means of facilitating and improving hand-labour, and of diminishing the danger and unhealthiness of certain trades, together with the improvement of the dwellings, furniture, and clothing of the working classes.

Among the most important subjects which will occupy the attention of this section, may be enumerated the following:—

The application of science to increase the production and improve the quality of various alimentary substances; the introduction of new sources of food, and the substitution in those processes in which edible substances are employed (such as distillation, &c.), of others not suitable for food; the modes of preserving food; the prevention of every kind of adulteration; the improvement of all the various processes employed in the making of bread; the increasing the healthiness of certain trades, and the prevention of accidents to which workmen are liable; the general amelioration of the condition of the workman, both as to lodging and clothing.

With reference to the question of the adulteration of bread, it is submitted that it is very undesirable to sanction the mixing of any other substance with the pure flour, as likely to afford facilities for fraud and misrepresentation.

Various suggestions as to the best means of preventing the sale of unwholesome or adulterated food, either by constant inspection or otherwise, as well as the principles on which penal laws should be framed for this purpose, will be brought under discussion.

The best modes of preparing food so as to economise its nutritive qualities, and of preserving it for the purposes of importation from parts of the world where it is very abundant, are questions of much weight.

The limitation of the hours of labour for women and children, the regulation of the age at which the latter are to be allowed to work, and the prohibition of their employment in occupations unsuited to their strength, are also questions of importance, as well as the ventilation and warming of work-rooms.

With reference to the interesting question of the improvement of the dwellings of the working classes, the formation of building companies where the shareholders would understand that a high interest for their capital was not to be expected, but that the object in view was a philanthropic one, is particularly recommended for consideration, while, on the other hand, the absolute prohibition of the use of any dwellings known to be unhealthy, will also be advocated. It is also suggested that architects might be appointed to superintend gratuitously the erection of houses for the poor, and that plans and drawings of dwellings found to be most suitable might be published and circulated.

The furniture, clothing, and, in short, everything relating to the domestic life of the workman, is capable of much improvement, and the formation of permanent Economic Museums is recommended, in which would be collected such specimens and models as would convey a knowledge of the articles best suited by their utility, durability, and cheapness, for the workman's domestic use. These institutions would thus afford him the advantage of comparing the articles manufactured in various countries, and of choosing those which appear to him most adapted to his wants.

In addition to the above-mentioned questions, the Congress will discuss the best means of rendering their deliberations really useful, and of extending and giving stability to their efforts, particularly in the following respects:—

1. The establishment of international correspondence on the principles laid down at the Philanthropic Congress at Paris.

2. The publication of a periodical notice of the various works and documents which refer to the proposed objects.

3. The establishment, in different countries, of a *Permanent Economic Museum*.

4. The arrangement of the time and place for their next meeting.

After the preliminary business of the Congress is concluded, it will probably be thought desirable at the first general sitting, to bring under its notice the most recent measures taken in various countries, both for preventing and moderating sudden deficiencies in the supply of food, and for the general improvement of the condition of the working classes.

Finally, the third section, which members of other sections will be at liberty to attend, will draw up a special report on the Economic Exhibition, so as to bring into notice those articles which may be most useful in reference to the objects of the Congress.

At the opening of each sitting, one of the secretaries will declare what publications or communications of any kind, relative to the subjects discussed, have been presented to the Congress, and the documents will be published either at length or in an abridged form, according to circumstances, in the printed report of the proceedings of the Congress, a copy of which will be sent to each of the members.

LAND DRAINAGE IN FRANCE.

The law which places at the disposal of French agriculture the sum of 100 million francs by way of loan, for promoting drainage, has been passed by the Legislative Body. The Count de Bryas, the Reporter in reference to this law, has once more shown the various benefits which this new and important discovery will confer upon those countries which adopt it on a large scale.

The report presented to the Legislative Body contains a statistical *resumé* on the importance of agriculture in general, and especially on the cultivation of wheat, which, it is believed, will be found useful for consultation. It carefully points out the permanent danger likely to accrue from insufficient harvests.

This leads to the important question of corn generally, and the imperative necessity of no longer leaving to chance and carelessness so important a matter as the food of the people. Viewing the subject in this aspect, it will be useful to quote at length from the report:—

"Agriculture in France holds the first place in the production of national wealth; it employs 25 million hands, and produces in value, every year, upwards of 90,000 millions of francs. This immense mass of produce, in which wheat figures to the amount of 1,400 million francs, is, nevertheless, not sufficient to prevent the country from going abroad to make up the necessary supply of grain.

"On striking a balance from 1815 to 1847, between the imports of wheat, amounting, in round numbers, to 50 million hectolitres, and the exports, amounting to 25 millions, it is plain that the production of the country shews a deficit on the whole, and that it has been necessary, on the average, since 1815, to import into France, annually, 900,000 hectolitres of wheat, representing a value of from 15 to 20 million francs, if the purchases were made at ordinary prices. Unfortunately the deficit does not occur with this annual regularity, and the danger consists in the uncertain intervals at which these insufficient harvests recur. There were upwards of 8 million hectolitres required in 1832, 1846, 1853, and 1854. On such occasions the prices rose immoderately; thus, in 1817, the average price of importation was 36 fr. 16 cent. the hectolitre, and in 1847 it rose to 56 francs. At other times the excess of the harvest did not allow of importation. We were able to export to England, in 1848, of wheat and flour, to the value of 30 million francs; in 1849, 43 million francs; in 1850, 60 million francs, and in 1851, 70 million francs. Unfortunately, looking carefully into the matter, we find that the prices of exportation did not repay the cost of cultivation; in reality, we exported at low prices, and obtained from abroad what was wanted at high prices, causing enormous sacrifices, amounting to 300 million francs for the year 1847 alone. Official statistics show, that altogether, from 1815 to 1847, a period of 32 years, we have obtained from abroad 144 days' subsistence, at a cost of 10,000 million francs, or at the rate of from 6 to 7 millions for every 24 hours.—(Moreau de Jonnés *Statistique de France*, p. 127.)

"In France, the cultivation of wheat extends over about 20 million hectares of our best land. Annually, six millions of hectares are under wheat cultivation, producing on an average 12 hectolitres the hectare, making about 72 million hectolitres. This rate of produce is distributed very unequally; some special hectares producing 40 hectolitres, others only six or seven. The general average in the department du Nord is 21 hectolitres, in the department du Lot it is much below seven. According to the opinion of men best qualified by practical experience in drainage matters, it is calculated that there are six million hectares of land under wheat cultivation which are capable of being drained with advantage. These figures are below those of our colleague, Mons. Gareau, given in his report on the Drainage Law of 1854; they scarcely come up to the calculations of Mons. Herve-Mangon, as shown in his "*Etudes sur la Législation anglaise*;" whilst they agree exactly with the calculations of Mons. Barral in his "*Traités de Drainage*."

"According to the most moderate supposition, the law now under consideration will promote the application of drainage to two million hectares, representing one-third only of the arable land which is capable of deriving sure benefits from it. Wheat will cover every year 500,000 hectares of those lands, upon the supposition of a four-course shift, as generally adopted in France.

"All agriculturists and economists agree to estimate the increased value of the harvests that would arise from drainage, especially in wet seasons, at eight hectolitres the hectare. Distributed over 500,000 hectares, this increase amounts to four million hectolitres. The influence of four million hectolitres on the wheat harvests of France, turning the scale of our markets precisely at those times which would otherwise have been times of scarcity, will be immense. We shall find in this resource a guarantee against fluctuations in prices; we shall diminish the anxieties and sufferings of the masses produced by dearth of food. Such periods of dearth, you are well aware, produce at times the most serious political embarrassments, and place our public finances in a critical condition. If this be so, are we not right in saying, it is a question of national importance."

THE PUBLIC HEALTH.

The Registrar General, in his report last week, says:—

"These diseases (zymotic diseases, and diseases of the respiratory organs and consumption) are natural to man, but their ravages are greatly aggravated by the physical impurities of the atmosphere, seen from a distance hanging in a cloud over London.

"The smoke of our manufactories has been rendered less dense than it was by Lord Palmerston's Act. It will ascend as dark as ever in winter from the fires of 340,000 houses; but Dr. Arnott has shown that the evil may be greatly diminished, and by the mere modification of lighting the fire from the top much of the smoke is burnt.

"The dust of the principal streets, which are now covered with horse dung, watered every day, and beat up by omnibuses, may be got rid of by frequent cleansing and by new processes. The railways which traverse the southern, the eastern, and the northern parts of London would, if extended to the centre and the west, not only relieve the thickest thoroughfares, but facilitate the movements and the traffic of the population, dwelling in houses which it was computed at the last census could be all visited by going over something more than 6,563 miles of ground.

"The third class of atmospheric impurities is invisible, but it arises from the long retention of the excrement of London under the houses and in the sewers. According to the estimate of Mr. Lawes, London could supply the farmers of England daily with 29 tons of ammonia, 51 tons of carbon, 14 tons of phosphates, 32 tons of mineral matter, and 14 tons of other matter, making in the aggregate 140 tons of dry manure, dissolved naturally in about 19 times its weight of water. The country requires this precious manure, which London is anxious to get rid of at any reasonable cost, as it is now known to be as insalubrious as it is offensive.

"The problem for the engineer to solve is, how can 3,000 tons of town guano be returned daily to the disinfecting soil, from which it was chiefly taken, with the least offence to health, and with the least cost? Shall it be distributed by pipes, or by railways? Shall it be disinfected by water, earth, ashes, or any chemical compound?

"Under the present arrangements some hundreds of thousands of tons of this matter lie in store in London, putrifying in cesspools and percolating the streets, while the residue is thrown into the Thames at a great cost.

"All these impurities of the air we breathe in London have evidently a natural tendency to increase more rapidly than the population, and can only be removed by the vigilance, intelligence, and energy of the Boards of Works.

"Every substantial sanitary improvement they effect will be as evident as the diminution in the mortality of the districts which now receive a purer water, and which will, it may be expected, ere long receive it on the system of constant supply."

Home Correspondence.

EXAMINATION.

Sir,—No act of the Society of Arts is more likely to tell upon the education of the artisan than the resolution which has been so vigorously adopted and carried out during the last few weeks. In the absence of any public system of secondary education, such as the continental governments have instituted, there has been hitherto no encouragement to the boy who has left the elementary school, to carry forward or to preserve the little knowledge that he possesses. I cannot, however, but lament that the advantage to be held out should be restricted to members of Mechanics' Institutes. If the Society would affiliate elementary schools, or, at least, *commercial* and *trade* schools, a great inducement would at once be held out to parents to keep their children longer at school, and a corresponding impulse would be given to *night schools*, in which boys removed to work might still prosecute their studies. Night schools, as a whole, I take it are a failure. To serve a substantial purpose they should supply the want of *Ecoles de Dessin* and other institutions of secondary education in France and other countries, for want of which our own country will soon be left behind in the markets of the world. The Society of Arts has taken the initiative in supplying that radical defect, but her leverage will be immensely increased if she would extend her patronage to all schools which profess to instruct the pupils in those principles of science that enter into the everyday work of our operatives.

I have under my care an elementary school and a higher school. Promising boys may be promoted from the lower to the higher without additional payment. All I want is the opportunity of sending up the best pupils to the examinations of the Society of Arts, and so of rendering them eligible to situations of trust, in order to open out the most encouraging prospect of promotion to a boy of real talent, though he belongs to the lowest condition of life.

By an extension of privilege, such as I have proposed, it appears to me that a great stimulus would be applied to popular education, while the chartered object of the Society of Arts would be directly promoted—the progress of arts, manufactures, and commerce throughout the land.

I am, &c.,
C. H. BROMBY.

Cheltenham, August 26th, 1856.

Proceedings of Institutions.

Greenwich.—The Society for the Acquisition and Diffusion of Useful Knowledge held their usual half-yearly general meeting of the members at the lecture-hall on Tuesday evening, the 29th of July, when the respective reports of the auditors, trustees, and committee were submitted, and the various officers chosen for the next six months. Mr. William Morris presided. Mr. Bass, the Hon. Secretary, read the report of the Committee, from which the following extracts are made:—"The receipts for the past half-year, including members subscriptions, sale of catalogues and newspapers, library fines, &c., have been £219 8s. 8d., and the expenditure for newspapers, books, lecturers, printing, salaries, &c., £214 6s. 3d., leaving a balance in the treasurer's hands of £5 2s. 5d. In the trustees' report, we find that £293 3s. 2d. has been received during the past half-year for hire of hall and the various class and school rooms, including donations of £5 15s., and the expenditure for interest on loans, local rates, and building account, amounts to £289 3s., leaving a balance in hand of £4 0s. 2d. The total debt now chargeable on the property of the society amounts to £6,265 19s. 10d. The present number of members is not, of course, quite so large as in the winter of the year; nevertheless, 670 adults and 140 minors paid their subscriptions last quarter, and 100 new members have joined the society since the commencement of the present quarter. An increasing number of books are taken out of the library, quarter after quarter. 3,238 volumes were read last February, being an increase of 21 over the February of the preceding year; 2,487 were issued last May, this number being greater by 53 than that taken out in the May of the previous year. Your committee are pleased again to report that, notwithstanding this large issue, it was found at the half-yearly examination of the books, held in March last, that not a single volume was missing. * * * * The Committee have received from the Astronomer Royal a very beautiful engraving on steel of the planet Saturn, as seen in a Newtonian telescope of ten feet focal length, drawn by Warren de la Rue, Esq., F.R.S. The engraving is considered by astronomers as conveying a perfect idea of the appearance of the planet in the year 1852, the systems of rings, both illuminated and obscure, being well delineated. * * * * The committee have bestowed considerable care in the preparation of the new lecture list. * * * * The committee direct attention to the result of the examination of the members of the Mechanics' and Literary Institutions of England, conducted by gentlemen of the highest eminence, selected by the Council of the Society of Arts. * * * * There were fifty-two candidates for examination, and so remarkable was the proficiency of some of them in the subjects in which they were examined, that it called forth expressions of astonishment as well as admiration from the learned examiners. Some of these gentlemen said that in the experience of their lives, although they had been engaged in some of the best educational establishments of the country, they had never known examination papers answered so elaborately and so well as they had been in this examination of the members of our Literary and Scientific Institutions. The Greenwich Society has reason to be proud of the result of this examination. Three of its members eminently distinguished themselves—Mr. James Scotson obtained the ten guinea prize and a certificate of excellence for chemistry—he had also awarded to him a certificate of proficiency in mechanics; Mr. James Spencer obtained the ten-guinea prize and the certificate of excellence in English History—he had also awarded to him a certificate of proficiency in English literature; Mr. James Ware obtained two certificates of competency in mathematics and geography, a certificate of proficiency in English literature, and a certificate of excellence in English history. Your committee do not think it out of place to mention that the youngest candidate for examination, a youth named Alfred Lister, between 13 and 14 years of age, who was sent up from the Leeds Institution by a grant from the committee accorded to him in admiration of his talent and his application, obtained a first-class certificate in mathematics, and that Mr. William Matthew Taylor, a member of the Windsor and Eton Literary and Scientific Institution, obtained the Society of Arts' prize of twenty-five guineas for general excellence in the examinations, he having obtained three certificates of the highest grade in mathematics, geography, and English literature. The Society of Arts have also recommended to the Inland Revenue Office for government appointments, two of the young men examined, viz., Robert Abbott and Charles Chambers, both of the Leeds Mechanics' Institution. Your committee are very much pleased that these examinations have been instituted, and at their results. Their tendency will be to make the Institutions of a more thoroughly educational character than they have hitherto been. It is very delightful to find that they are now supplying so many persons from one end of England to the other with a means of spending their leisure time pleasurably and profitably; that books which "soothe, and cheer, and elevate" are taken by tens of thousands from their libraries, and that their lectures are furnishing so much instruction and amusement to the many who hear them; but it is of the first importance that the young mind should be educated; that it should be supplied with useful knowledge and strengthened by a judicious exercise of its higher faculties; that it should be prepared for the efforts it will have to make in this world, and encouraged to make them; that it should feel that its labours will not be useless nor unregarded, but that it is watched by those who are anxious to foster its development and prepare the way for its reward. Your committee hope that you will not lose sight of what the Society of Arts is doing for these Institutions; that you will, by the formation of classes, co-operate with them in their praiseworthy endeavours to make them more truly useful than they have hitherto been, and that at the examination of next year, this Society will distinguish itself even more than it has done at that which has just concluded. * * * * Your committee, in conclusion, congratulate you upon the present condition of the Society. There are but very few which maintain their numbers so steadily as it does. They are pleased that it manifests no signs of decay; they would be better pleased if it kept advancing, increasing its numbers, and consequently extending its usefulness. They believe that it and all kindred Institutions must advance, as their influence is more generally and more correctly understood, and as men become more anxious for the mental, moral, and social improvement of their fellow-creatures." Mr. G. W. Bennett, in moving that the report be received and adopted, said he did so with much pleasure, for two reasons; in the first place, because it was now certain that the Institution was in a perfectly satisfactory condition, both with respect to the number of members, and as to its finances; and next because he could see in the report a prospect of a still more satisfactory nature. Institutions of this description had been hitherto, perhaps, too much devoted to mere amusement (not that he objected to amusement, for that, among a hard-worked population, was indispensably necessary), but because he believed it was most desirable that instruction, more particularly that sort which would enable a working man to earn his daily bread more easily, should be combined with it. He most positively believed that this would be the result of the examinations now established through the instrumentality of the Society of Arts. It was well that working men should be taught to look forward to something more than mere daily drudgery; that they should be convinced that by extra exertion they could raise themselves above their ordinary station; that the only limit to their position in life, was that which would be fixed by their own intellectual acquirements. This was true equality, for although politics were excluded here, he could not help saying, that after all, mental acquirements would so far secure the position of their owner, that mental and political position would be the same. His friend, Mr. Glaisher, had told him that the answers from those working men, even on abstruse questions, were such as to startle him; that they were such as he would scarcely have expected from University students. This was most encouraging, and would teach them that societies of this description had only just reached the most important phase of their career. They were now most truly becoming the schools of the people. With these observations he now begged to move the above resolution. The report was unanimously received and ordered to be entered on the minutes.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette August* 15*th and* 22*nd*, 1856.]

***Dated* 1st *August*, 1856.**

1817. William Paton, Springvale, Glasgow—Improvements in railway wheels.
1818. Alexandre Tolhausen, 7, Duke-street, Adelphi—A new and improved flexible pocket-umbrella, being likewise applicable to common and other sticks, canes, &c. (A communication.)
1819. John Watkins Brett, Hanover-square—Improvements in letter and numeral printing electric telegraphs.
1820. William Wood, Monkhill, near Pontefract, and Matthew Smith, Heywood, Lancaster—Improvements in looms for weaving terry and cut pile fabrics.
1821. William Wood, Monkhill, near Pontefract, and Matthew Smith, Heywood, Lancaster—Improvements in apparatus for cutting the wires out of terry fabrics.
1823. Eugene Perré Chevalier, Brussels—Improvemeuts in the manufacture of cigars.
1824. Richard Albert Tilghman, Philadelphia, U.S.—Improvements in hydro-extractors or centrifugal machines.
1825. Robert Reeves, Bratton Westbury, Wilts—Improvements in machinery for sowing or depositing seeds and manure.

Dated 2nd August, 1856.

1827. Oliver Long, Cornhill—Improvements in mechanical knife-cleaners.

1829. Thomas Donkin, Bermondsey—Improvements in the glazing of paper. (A communication.)

1831. Thomas Green, Leeds—Improvements in mowing machinery.

Dated 4th August, 1856.

1833. Charles Gustavus Gottgetreu, 41, Charterhouse-square—Lithographic printing in oil and varnish colours and metal on glass, wood, papier maché, marble, metal, porcelain, or any other material that offers a suitable service.

1834. Nicolas Cadiat, 12, Rue de l'Odéon, Paris—The application of centrifugal force for purifying liquids.

1835. Charles Théodule Launay and Jules Chopin, Paris—Improvements in increasing the illuminating power of gas.

1836. George Walker and James Scrimgeour, Belfast—Improvements in spinning frames.

1837. Thomas Barnabas Daft, Dublin—Improvements in the manufacture of cast-iron pipes.

1838. Alexander Wright, Millbank-street, Westminster—Improvements in lighting mines and subterranean places with gas.

1839. Josiah Firth, Heckmondwike, Yorkshire, and Joseph Crabtree, Mill-bridge, near Heckmondwike—Weaving Scotch, Kidderminster, and Dutch carpets by means of a power loom.

Dated 5th August, 1856.

1840. Henry Walker Wood, Briton Ferry, Glamorganshire—Further improvements in the manufacture of fuel, and for a new mode of preserving coal and coke and other fuel.

1841. James Benjamin Bowen, Chipping Norton—Improvements in the manufacture of gloves.

1842. Charles Frederic Vasserot, 45, Essex-street, Strand—Improvements in machinery for cutting nuts, screws, and pieces of polygonal shape. (A communication.)

1843. Thomas Maples, Derby—Improvements in corn mills.

1844. Antoine Dominique Sisco, Paris—Improvements in railway brakes.

1845. Andrew Smith and William Smith, Mauchline, Ayr, N.B.—Improvements in ruling or delineating ornamental figures.

1846. Jean Jacques Danduran, 13, Charlotte-street, Fitzroy-square—An apparatus called the self-swimmer.

1847. Edwin Blomeley, Fernhill Mill, Bury—Improvements in the manufacture of fabrics applicable to various purposes for which airproof and waterproof fabrics are usually employed.

1848. John Keith, Eltham, Kent—Improved machinery for making envelopes. (A communication.)

1849. Alfred Vincent Newton, 66, Chancery-lane—An improvement in primers for fire-arm cartridges. (A communication.)

1850. Augustus Pfaltz, Massachusetts—A new and useful mode or process for making soap from rosin.

1851. Joseph Auguste Monnier, Marseilles—Improvements in transmitting motive power.

Dated 6th August, 1856.

1852. Alfred Mitchell, Liverpool—Improvements in apparatus for exhibiting and distributing advertisements, and for like purposes.

1853. George Holworthy Palmer, Adelaide-road, Haverstock-hill—Improvements in furnaces for generating heat.

1855. William Watt, Belfast—Improvements in treating or preparing Indian corn and other grain for fermentation and distillation.

1856. Thomas Evans, junr., Belmont-terrace, Lewisham-road—Improvements in harness.

1857. William Hall, Elisha Wylde, and William Waite, Birmingham—Improvements in steam-engines.

1859. James Farrar, Bury, and Henry Spencer, Rochdale—Improvements in apparatus for regulating the pressure and flow of gaseous liquids.

Dated 6th August, 1856.

1860. Lionel Weber, Bruxelles, Belgium—A combination applicable to keys of door-locks to prevent their being opened by pliers or other instruments from the outside.

1862. William Green, York-street, City-road—Improvements in the manufacture or production of fabrics and surfaces in imitation of, and as substitutes for, leather for bookbinding and other uses, and in machinery or apparatus for effecting the same.

1864. Coleman Defries, Houndsditch—Improvements in the roof lamps of railway carriages.

Dated 8th August, 1856.

1866. Robert Davenport, 12, Jonathan-street, Vauxhall—Certain improvements in kilns for burning pottery, earthenware, china, porcelain, and similar substances, to enable them to consume their own smoke.

1870. William Gorse, Birmingham—A new or improved door fastener. (A communication.)

1872. John Stephens, Suffolk-place, Westminster—An improvement in pipes for smoking.

Dated 9th August, 1856.

1876. Thomas Whittaker, Accrington—Improvements in the mode or method of washing or cleansing woven fabrics.

1878. John Darlington, 36, Cannon-street—Improvements in superheating steam. (A communication.)

1880. Chapman March, Alwalton Mills, Huntingdonshire—Improvements in propelling and working ships and vessels.

1882. Edward Owen, Aberdeen-terrace, Blackheath—Improvements in the manufacture of gas, and in the obtainment of products arising in such manufacture.

Dated 11th August, 1856.

1884. Peter Armand le Comte de Fontainemoreau, 39, Rue de l'Echiquier, Paris—A new electro-motive engine. (A communication.)

1886. Alexander Symons, George-street, Mansion-house, and Edward Burgess, Clerkenwell-green—Improvements in noctuarys or tell-tales for ascertaining the fidelity of watchmen and for other purposes, and in the application of electricity to such apparatus.

Dated 12th August, 1856.

1888. Nicholas Doran Maillard, Dublin—An improved mechanical and magnetic compass.

1890. Edwin Firth, Flush Mills, Hickmondwike, near Leeds—Improvements in finishing mohair cloth.

1892. William Henry Brown, Albion Iron and Steel Works, Sheffield—Improvements in steam hammers.

Dated 13th August, 1856.

1894. David Lesser, Manchester—Certain improvements in machinery or apparatus for making "lozenges," or other similar articles.

1896. William Church and Henry Whiting Hamlyn, Birmingham—An improved method or improved methods of constructing or building hay and other ricks.

Dated 14th August, 1856.

1898. Richard Archibald Brooman, 166, Fleet-street—Improvements in the manufacture of artificial stone and building and paving materials. (A communication.)

1900. Alfred Priest and William Woolnough, Kingston-on-Thames—Improvements in horse-hoes.

1902. Thomas Bilbe, Nelson Dock, Rotherhithe—Improvements in the construction of ships and other vessels.

1904. James Bannehr, 11, Bedford-circus, Exeter—Improvements in the manufacture of name and sign plates, boards and slabs, door and house numbers, street names, tomb stones and monumental slabs, and inscriptions, by substituting earthenware or porcelain, instead of the materials now in use for the above-named articles.

1906. John Goddard, 29, Moss-row, Bagslate, near Rochdale, and George Hulme, 4, George-street, Rochdale—Improvements in carding engines for the more speedy and effectual doffing or stripping of the cotton, woollen, silk, or other fibrous substances therefrom.

WEEKLY LIST OF PATENTS SEALED.

Sealed August 20th, 1856.

425. Thomas Smith and Joseph Gill.
463. David Jones.
471. William Sangster.
475. Bennett Johns Heywood.
487. Samuel Henn and Thomas Haddon.
508. John Smith.
522. Foster Connor.
542. John Aspinall.
544. John Venables.
598. Edmund Alfred Pontifex.
630. Henry Bessemer.
1004. Thomas Walker.
1268. Alfred Vincent Newton.
1342. Archibald Sinclair.
1356. Adam Stamm.
1410. Hector Grand de Chateauneuf.
1478. John Taylor.

Sealed August 26th, 1856.

288. Robert Barrow.
509. Isaac Westhorp.
513. Elisha Thomas Archer.
523. Charles Barlow.
524. William Allen Turner.
538. Robert Maynard.
543. John Edward Hodges.
545. John Edward Hodges.
568. John William Scott.
593. Henry Horner and Richard Bagley.
615. Prosper Pimont.
618. Phillip Marcus.
619. William Yates.
622. Charles Coates.
625. Edwin Thomas Wright.
659. Alfred Vincent Newton.
1023. Samuel Dyer.
1227. Charles Dewick, senr.
1241. Frederick Peter Dimpfel.
1373. Thomas Skaife.
1543. George Harvey and Alexander Harvey, junr.
1561. Alfred Vincent Newton.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

August 18th.

1942. Charles Watt and Hugh Burgess.

August 19th.

1949. Alexander Cuninghame.
1977. William Austin.

August 21st.

1982. Eugène De Varroc.

August 22nd.

1959. James Webster.
1963. John Whiteley.
1973. Alfred Swonnell.
2022. William Beckett Johnson.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address.
3868	Aug. 19.	Button, and fastening for the same........	Wm. Thistlewood	Birmingham.
3869	Aug. 25.	Buckle	John and Daniel Holloway ...	Birmingham.
3870	Aug. 27.	Candle Lamp	Price's Patent Candle Company (Limited)	Belmont, Vauxhall.